The genus *Volvarina* (Volutacea : Marginellidae) in Brazil. Part 1 : revision of the species described by A. Bavay, and closely related species

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KEYWORDS. Marginellidae, Brazil, *Volvarina*, taxonomy, type material, phylogeny.

ABSTRACT. Six Brazilian species of *Volvarina* described by A. Bavay are revised, together with a recently described related one. Two new species of *Volvarina* are described. The phylogeny of Brazilian *Volvarina* is tackled.

RÉSUMÉ. Six espèces brésiliennes de *Volvarina* décrites par A. Bavay sont révisées, ainsi qu'une espèce apparentée récemment décrite. Deux nouvelles espèces sont décrites. La phylogénie des *Volvarina* brésiliennes est abordée.

INTRODUCTION

The Brazilian fauna of marginellids remains poorly known, despite the great diversity presented by the new phenae brought to light by local collectors over many years. Most of these phenae are provisionally attributed to Caribbean taxa, depending on very superficial similarities. This practice tends to dissuade further investigations about taxonomic or biogeographic aspects.

Very few species were described from Brazil subsequently to those described by Bavay at the beginning of the twentieth century :

– One large *Prunum* (*Marginella matthewsi* Van Mol and Tursch, 1967), one large *Dentimargo* (*Marginella cloveri* Rios and Matthews, 1972) and one tiny *Volvarina* (*Prunum amphorale* de Souza, 1992), all of them from equatorial zones, in moderate depths.

– One medium sized *Volvarina* (*V. pontesi* Rios and Leal, 1993) from bathyal levels, off Southeast Brazil.

Recent records confirm that an important number of tiny to large marginellid species are still to be discovered along the thousands of kilometers of Brazilian coastline. However, their study cannot seriously be undertaken without a preliminary revision of the available taxa, the comparison of linkable populations, and a reliable knowledge of both their geographic and bathymetric distribution.

By reviewing the taxonomic status of species belonging to the genus *Volvarina sensu stricto* whose identity remains in doubt, it is hoped to help to clarify the documentation concerning Brazilian marginellids, and to encourage further research on their biogeography and phylogeny. This paper is mainly devoted to the species described by A. Bavay from 1906 to 1922.

In 1985, E. C. Rios tentatively performed the only general faunistic inventory of Brazilian marginellids. After the study of the correspondant iconography, and a comparison with the available material stored in European public and private collections, we can state that the Brazilian fauna of marginellids, as presented in Rios, shows only very superficial similarities with the fauna known from the Caribbean Sea.

Concerning the genus *Volvarina s.s.*, just one single well-known species from the Caribbean Sea can be confirmed as belonging to the Brazilian fauna. This species, *Volvarina avena* Kiener, is represented throughout the whole Caribbean area by important populations in shallow and moderate depths, whilst just known by scarce specimens from the Brazilian coasts.

All the other named Caribbean species belonging to the genus *Volvarina s.s.* and proposed by Rios as inhabiting Brazil, are invalidated by his figures, and it would have been more correct to have considered them as non-described endemic species from Brazil. This applies to the following references no. 528 (as *P. amabilis* Redfield), no. 530 (as *P. bella* Conrad), no. 544 (as *V. albolineata* d'Orbigny), no. 546 (as *V. avenacea* Deshayes = junior synonym for *V. avena* Kiener), no. 547 (as *V. gracilis* C.B. Adams, proposed by Rios as a senior synonym of *M. joubini* Bavay = *V. bahiensis* Tomlin).

The occurrence of *V. gracilis* C.B. Adams in Brazil remains to be verified, as explained below, and *V. bahiensis* Tomlin is not the same species (cf. discussion on *V. bahiensis*). On the other hand, reference no. 524 in Rios is to be confirmed really to deal with the genus *Dentimargo*, as the flexuous labrum of the figured shell better suggests a *Volvarina* species. As demonstrated below, several

badly known species of *Volvarina* reaching a length of 2 to 4 mm are living along the Brazilian coasts, and reference no. 524 just could be a non-described one.
Reference no. 549 is compared to *V. roberti* Bavay, from Madeira, Northwest Africa. However, figure 549 clearly represents a shell of *V. serrei* Bavay, described from Brazil, the latter species also being illustrated and correctly named under the reference no. 550.
It is noted that the name of *V. lactea* Kiener is proposed under the reference no. 548 and illustrated by a shell of *Hyalina pallida* Linnaeus, which belongs to a different non-radulate genus (even if probably a distant relative of the complex *Prunum/Volvarina*). *H. pallida* is common all around the Caribbean province, in rubble or sand, and it can occur in very shallow water in sheltered environments. The species may not be rare in Brazil, but local collectors do not employ methods for collecting microshells in shallow environments.
Six specific taxa belonging to the genus *Volvarina s.s.* were described by Bavay : *V. perrieri* 1906, *V. serrei* 1913, *V. joubini* 1913 (preoccupied and renamed *V. bahiensis* by Tomlin, 1917), *V. germaini* 1913, *V. perexilis* 1922, *V. pupa* 1922.
The first species is described from material obtained by Dupetit-Thouars during the campaign of the ship *La Vénus* in 1836-1839. The three next species were obtained by Mr P. Serre, correspondent of A. Bavay in Salvador de Bahia. The last two species were found in Jousseaume collection, dredged off Parahyba.
It is proposed to review hereunder these supposed endemic species, accepting all of them in the genus *Volvarina, sensu* Gofas (1989, p. 160). In the course of this study, some related phenae are studied, and two new species are described.

Abbreviations

IRSNB : Institut Royal des Sciences Naturelles de Belgique, Brussels.
MCZ : Museum of Comparative Zoology, Harvard University, Cambridge, USA.
MHNG : Muséum d'Histoire Naturelle de Genève, Switzerland.
MNHN : Muséum National d'Histoire Naturelle, Paris.
MNRJ : Museo Nacional do Rio de Janeiro, Brazil.
MORG : Museo Oceanográphico do Rio Grande, Brazil.
NNM : Nationaal Natuurhistorisch Museum, Leiden, the Netherlands.
Coll. F.B. : Collection of the author.

SYSTEMATICS

Genus ***Volvarina*** Hinds, 1844.
Type species : *Marginella nitida* Hinds, 1844 (subsequent designation by Redfield, 1871), junior synonym of *Volvarina mitrella* (Risso, 1826).

***Volvarina perrieri* (Bavay, 1906)**
Fig. 1 – 1bis.

Marginella (Volvarina) perrieri Bavay, 1906, pp. 248-249, pl. 7, figs 5-6.

Type material.

A. Four syntypes in MNHN (type collection), in 2 lots :
– Lot 1 : 3 shells (sized 10.8 x 4.3 mm to 10.3 x 4.2 mm) deposited by Bavay with two labels, one of them bearing the inscription "type figuré. 1. Malouines. Expéd. de *La Vénus* 1839".
– Lot 2 : 1 shell (sized 10.5 x 4.2 mm) from the Jousseaume collection, erroneously labelled "*Marginella perrieri* Rochebr."
B. One syntype in IRSNB, from the Dautzenberg collection, labelled in the hand of Bavay "*Volv*^{a} *perrieri* Bavay. Voyage de *La Vénus* 1839. I. Malouines. Museum".

Original description.
(Translated from French)

"Shell of poor length, slender fusiform, particularly bulging in its upper part; spire well apparent rounded conoid, with an obtuse top, made of four whorls; the last whorl of the shell raising clearly around the aperture; this one triangular very slender, larger on the base which is obliquely rounded; right border externally thickened and slightly curved inwards all along its medium part; columellar border bearing on its base four somewhat delicate oblique plaits.
Colour transparent porcellaneous white but suggesting however three very faint shades of fawn bands on the dorsum of the shell."
As noted by Bavay, the shells of *V. perrieri* look like the well-known Caribbean *V. avena* (Kiener, 1834). Bavay, however, establishes the identity of *V. perrieri* through slight differences with *V. avena*, having a less slender shape, thinner and more oblique columellar plaits, and a subtranslucid whitish colour.
The syntypes correctly match the description, even for the average size (given as 11 x 5 mm by Bavay).

Type locality.
Malouines Insulas (Falklands).

Remarks.

None of the located syntypes have a small hole on the ventral side of the last whorl, just near the anal canal, as pictured in the type figure (Fig. 1a, b). However, the origin of syntypes housed in MNHN and IRSNB is beyond doubt. Bavay specified that several samples coming from the expedition of *La Vénus* were represented in the Paris Museum, without stating precisely how many. It seems probable that more than five shells belonged to the original lot. As the rediscovery of the figured type and potential holotype remains possible, it seems better for now to avoid the designation of a lectotype, and wait for further investigations in French and British collections where specimens from Bavay are currently found.

The original characters proposed by Bavay for a distinction of *V. perrieri* at a specific level are flimsy : they all belong to the range of the natural variability of *V. avena* (Kiener). The whitish colour of the shell is not a common feature for *V. avena*, but whitish live specimens are found towards the northern edge of the geographic distribution of the species (Florida, Bermuda, Yucatán...), and an equivalent situation could occur towards the southern limits of its distribution, in Brazil.

Moreover, the present condition of the syntypes of *V. perrieri* leads to consider them as worn-collected specimens, even if they did continue to fade during their long stay in drawers.

We note also that *V. avena* is very scarcely recorded from Brazil. Rios (1985) records the species from Amapá to Rio de Janeiro, in the Atol das Rocas and in the Abrolhos Islands. Two specimens coming from this latter locality are in the collection of the author (leg. E.C. Rios). These two specimens, collected at 5 m, are 11.9 to 12.1 mm in size and present exactly the same structure of shell, columellar plaits and decoration of three orange bands on the last whorl, as found in specimens collected in the Caribbean Sea.

Discussion.

The main trouble about the taxon *V. perrieri* was for many times its type locality (Falklands) which attributed to it the status of a magellanic species, restricted to cold waters. As a result, *V. perrieri* has been assimilated by modern authors (cf. Carcelles, 1953, p. 11) to the magellanic group of *V. warreni* Marrat, 1876 (senior synonym for *V. patagonica* Von Martens, 1881).

Bavay himself noted that two new marginellids were recently discovered by the French Expedition to Cape Horn, as a confirmation of the plausibility of the occurrence under subantarctic latitudes of a species of *Volvarina* belonging to a tropical group.

In fact, the so-called new species quoted by Bavay from the French magellanic expedition are *V. hahni* (Mabille, 1884) and *V. dozei* (Mabille and Rochebrune, 1889), both found between the Straight of Magellan and the Falklands, at a depth of 120 m. *V. hahni* Mabille is clearly a junior synonym of *V. warreni* (Marrat, 1876) as confirmed by the study of the four syntypes stored in MNHN – Type collection. The high-spired *V. dozei* does seem really to be a different species, and clearly belongs to the same "subantarctic group" of *V. warreni* which holds numerous phenae and possible species recorded from southern latitudes off South Africa and off Australia and New Zealand. Amongst these species is numbered *Volvarina pontesi* Rios and Leal, 1993, fished off Southeast Brazil in 200 to 1,140 m, and which does present a very high and produced spire, longer than the aperture, and a very narrow body whorl. We note that all the species belonging to this group *V. warreni* are fished in deep and somewhat cold waters, as opposed to the species belonging to the group *V. avena* which are restricted to shallow to moderate depths (0-25 m for *V. avena*), in warm waters.

The remarks by Bavay concerning the French Expedition to Cape Horn clearly led Jousseaume to attribute erroneously *V. perrieri* to Rochebrune (cf. type material references), who never described such a species, and did not give any mention about the taxa *V. avena* and *V. perrieri* from French Antarctic collecting.

Furthermore, the study of the report of Dupetit-Thouars (1840) on the "Voyage de *La Vénus*", from which was obtained the type material of *V. perrieri*, leads to reconstruct the real opportunities of sampling during the travel in the Southwest Atlantic.

La Vénus left Tenerife on 10 January 1837, passing Boavista, Fernando de Noronha and Cabo Frio, without stopping. The expedition stayed in Rio de Janeiro from 4 to 16 February. No collecting is mentioned, but it is very likely that diverse accumulations of natural objects were made, as was customary at this time and for this kind of expedition.

La Vénus started from Rio on 16 February, passed by Santa Catarina Island on 20 February and arrived at the mouth of Rio de la Plata on the 24th. Soundings were made along Isla de Lobos, Isla Flores, Montevideo and Buenos-Aires. On 8 March, *La Vénus* was west of the Falklands, mid-distance between the continent and the archipelago, and made soundings in 100 m. Then, sediment was obtained "for the first time in this trip", using a small rake-dredge.

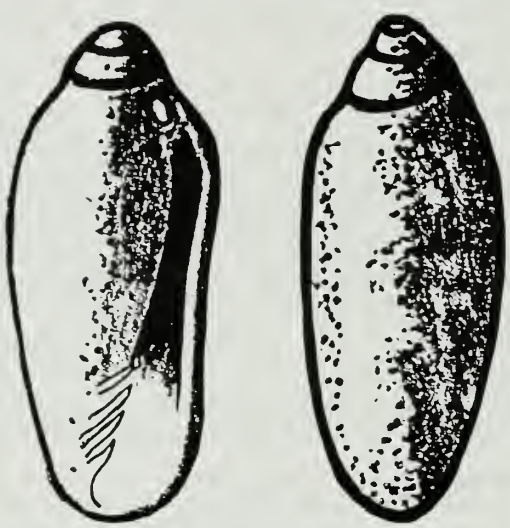
A full bag of grey-black silty sand was brought up. Amongst the names quoted for shells sampled from this sediment, some of them ("terebracules, olives...") may actually refer to species of *Volvarina*.

In fact, two specimens of the species *V. warreni* are stored in MNHN – General collection, and labelled as "*M. hahni* Rochebrune, collected by Dupetit-Thouars, Expedition of *La Vénus* (Malouines)". This origin is quite likely and could strongly support the conviction of Bavay (if these specimens were known by him) about the subantarctic origin of *V. perrieri*.

On 9 March, soundings were made in the neighbourhood of Eagle Pass. On 11 March, *La Vénus* passed along the Straight of Magellan, and arrived in Valparaiso on 27 April, without stopping along the southwestern Chilean coast.

So, we can state that the expedition had only two real possibilities for collecting shell material in the Southwest Atlantic : during a 12 daystay in Rio de Janeiro, and during a single dredging attempt in 100 m, west of the Falklands, in the same area where the French Scientific Mission to Cape Horn later obtained the slender high-spired *V. hahni* (= *V. warreni*) and *V. dozei*, but no phena from the group *V. avena/perrieri*. Numerous collectings have been reported during the XXth century from Magellanic province by British, Argentinian and Uruguayan authors (Powell, 1951; Carcelles, 1946; Ureta, 1961) with many records of *V. warreni*, but with no mention of the group *V. avena/perrieri*.

This fact certainly does allow us to conclude that the Falklands is an incorrect type locality for *V. perrieri* Bavay, and it is highly probable that the type material of *V. perrieri* was dead-collected on beaches in the bay of Rio de Janeiro (which seems to be precisely the southern limit of the distribution of *V. avena* Kiener) and later mixed up with the material obtained off the Falklands.



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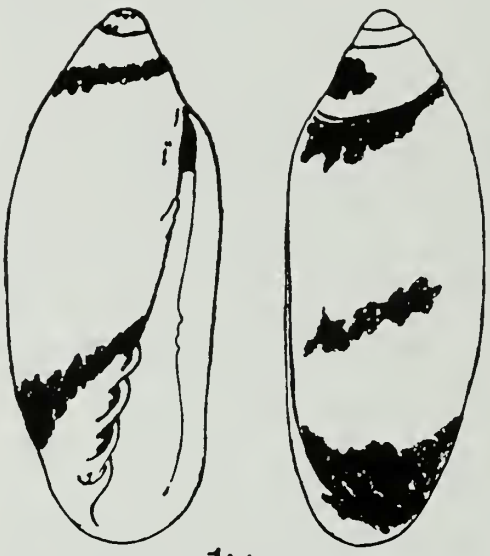


1bis

Fig. 1 : type figures of *Marginella (Volvarina) perrieri* Bavay, 1906, pl. VII, figs 5-6.
Fig. 1bis : lectotype of *Marginella avena* Valenciennes in Kiener, 1834. MHNG 28432 (11.3 x 4.5 mm).

Conclusion.

Volvarina avena was originally described by Kiener (1834) as "*Marginella avena* Valenciennes", and the referred material is said to have been studied in the Massena collection (included in the Delessert collection, now in Geneva Museum).
In his description, Kiener refers to "white or yellowish hyalinous" shells, and in his comments, he says that young specimens are yellowish with three darker spiral bands on the last whorl. In fact, Kiener clearly refers to several specimens, possibly coming from different origins.
When quoting the taxon *M. avena* as a species from Valenciennes, Kiener surely referred to a label attached to a lot, originally studied by Valenciennes and designated by himself as "*M. avena*", with an eye to a future description. In fact, Valenciennes never did publish such a species, and the nomenclatural rule in this case is that Kiener has to be considered as the original author of the taxon *M. avena*.
The material which is now stored in the Delessert collection (MHNG) as supposed syntypes of *M. avena* Kiener is a lot of thirteen shells removed from a card with the manuscript mention "*M. avena* Kiener – *varia* Sow. Antilles", without any reference to Valenciennes or to the Massena collection. Actually, the labels in the Delessert collection are generally poor, and the original labels from Kiener were rarely conserved. It was verified that amongst the thirteen supposed syntypes, there are full-white shells as well as yellowish shells with darker bands. Furthermore, Kiener gave a size of 12 x 4.5 mm (5.5 x 2 lines) for the species, and the supposed syntypes in the Delessert collection range from 8.7 to 11.7 mm long. So, this material can be accepted as the material used by Kiener for the description of *V. avena*, even if the label joined to this lot was apparently attributed afterwards. It is therefore proposed to accept this lot of thirteen shells from the Delessert collection (MHNG, ex 993/192) as syntypes of *M. avena* Kiener.
We designate and figure one of the best conserved and coloured shells as the lectotype of *M. avena* Kiener (MHNG 28432, ex 993/192; 11.3 x 4.5 mm; Fig. 1bis a, b), the other twelve shells of the lot being considered as paralectotypes (MHNG 28433, ex 993/192).
It is proposed to confirm as type locality the broad geographic reference given by Kiener : "Habite les mers des Indes Occidentales" or : "Inhabits the seas of the West Indies", which means in fact, for French people from this time, all the Main and Lesser Antilles.
We note that the taxon *Marginella avenacea* Deshayes, 1844, often quoted by authors – even in modern times – as being distinct from the species *M. avena* [and sometimes used for naming *V. avenella* (Dall, 1881)], is just a misspelling for *M. avena* Kiener, as clearly shown by the redescription of "*M. avenacea* Kiener" by Deshayes (1844, pp. 454-455).
Many more synonymous taxa have subsequently been described as *M. varia* Sowerby, 1846, *M. beyerleana* Bernardi, 1853, and other names till the recent years, but without any evident biologic meaning, except that *Volvarina avena* has been shown to be a polymorphic species, with more or less the same kind of intrapopulational and ecological variations within the different parts of its widespread distribution.
We propose to consider *Volvarina perrieri* (Bavay, 1906) as a junior synonym of *Volvarina avena* (Kiener, 1834).

***Volvarina serrei* (Bavay, 1913)**
Figs 2-10, 32, 35

Marginella (Volvarina) serrei Bavay, 1913a, pp. 359-360, text-fig. 3.
Type material.

Fourteen supposed syntypes in Paris Museum (MNHN – type collection), in two lots :
– Lot 1 : Ten shells (adult, subadult and juvenile), most of them deeply worn or drilled, rather slender, except for one medium sized full-white adult shell, pictured herein (Fig. 2). Shells are 5.7 to 3.7 mm long and 2.6 to 1.65 mm wide. With a label from Bavay : "Bahia, Brésil, Sables, M. Serre". On one more recent label : "paratypes".
– Lot 2 : Four shells without label, in same conditions of conservation. One worn adult, two subadults and one juvenile.

Other material examined.

All in the collection of the author.
– North Brazil (00°12'S, 47°03'W). Para State, 33 m. Dead dredged, 26-04-68 by NOAS Expedition – N.NE. II. One adult drilled shell. Length : 7.85 mm. Leg. P. de Souza, 09-91.
– Natal State. Three white adult shells, beach collected. Length : 4.1 to 5.2 mm.
– Bahia State, Salvador, Ribeira. Three specimens, live collected by screening, at 1 m, in sand with broken shells. Length : 5.2 to 5.6 mm.
– Bahia State, Salvador. Two specimens live collected at 1 m, under rocks, in sand. Length : 7.9 to 9.1 mm. Leg. J. Coltro, 05-90.
– Bahia State, Itaparica. One specimen, live collected. Length : 7.75 mm. Leg. de Souza, 13-03-91.
– Espirito Santo, Guarapari. Three specimens, live collected under rocks, at 15-20 m, by A. Bodart, 10-92. Length : 8.1 to 8.95 mm.

– Espirito Santo, Guarapari. Three specimens, live dredged at 20-25 m, on bryozoan bottom. Length : 5.45 to 5.55 mm.
– Espirito Santo, Guarapari. One specimen, live dredged at 30-40-m. Length : 6.8 mm.
– Rio de Janeiro State. Six specimens and shells, live and dead dredged in muddy sand, off Rio de Janeiro, at 80-100 m. Length : 6.1 to 7.9 mm. Leg. J. Coltro.
– Sao Paulo State, I. Ihabela. One specimen, live dredged at 30-40m, in sand and broken shells. Length : 8.4 mm. Leg. J. Coltro, 11-91.

Original description.
(Translated from French).

"Medium sized shell, slender egg-shaped, narrowed to the base, white and shining; four whorls for the spire, which is produced, clearly conical, just slightly obtuse to the top; aperture slightly sinuous, narrowed to the top, widened to the base; wide and thick labrum in its upper and medium part, thinner to the base, anteriorly slightly margined, smooth within; columellar side bears four oblique subequal plaits, the upper one being slightly more faint than the others.
The size, in this species, is somewhat variable, but the general shape is constant.
Length : 6 mm to 4 mm; width : 2.2 to 1.6 mm".

Type locality.

Bahia (Brazil). Found in sands sent to Paris Museum by Mr Serre.

Distribution.

Known from Para State (Northern Brazil) to São Paulo State (Southeastern Brazil), from 1 to 100 m. Not recorded from dredgings of OCPS campaigns off Surinam (Leiden Museum – Netherlands) neither from dredgings off Rio Grande do Sul (E.C. Rios and J. Coltro, pers. com.)

Habitat.

In sand, mud or detritus; open environments of soft bottoms, bryozoan hard bottoms, or under rocks.

Remarks.

The first lot in the type-collection of Paris Museum clearly belongs to the type material, while the status of the second lot is less evident, because it lacks an attached label. Presenting however the same state of conservation and same proportions, this second lot has probably the same origin as the first one, and deserves to be kept in the type material.

It was not possible to sort out from these two lots any specimen which could clearly match the type figure (Fig. 3). It seems that the type figure is a blend of "characteristic features" of the species, and not the direct picture of one shell. Consequently, it does not seem possible to distinguish any holotype in the lots. It should be emphasized that the mention "paratypes" attached to the first lot strongly suggests that an holotype was at the same time marked, but that it could have been loaned or provisionally misplaced during the period we examined this type material. For the same reasons as presented about *V. perrieri*, we prefer to refrain from the designation of any lectotype, the type material (lot 1) being sufficient for the determination of the species, and the discovery of complementary lots belonging to the type material remaining possible in public or private collections.
There are several features of the shell morphology and of the pattern of decoration which may be important for the distinction at the specific level (Figs 4-10, 32, 35) :
– The anterior columellar plait is very short and thin, faintly apparent under the second plait (Fig. 35).
– The number of columellar plaits varies from 4 to 5. The frequency of a well-marked fifth plait seems to be more important in large specimens (over 7 mm) living in shallow to moderate depths (1 to 40 m) : in this case, the rate of presence of a fifth plait is 70%. This rate is inverse for smaller specimens (4 to 7 mm), amongst whose 70% bear just four plaits and 30% bear a very faint fifth one. However, more investigation is needed, and it is to be verified if this distribution has a concrete statistic worth for the whole species *V. serrei*, or if it just depends on the observed populations.
– The outer margin of the labrum is very wide, narrowed in the upper part, and widely surrounding the siphonal canal. In well-coloured specimens, the margin is decorated with brown horizontal rays or stains on an orange-brown background (Figs 6, 9).
– The background colour is very variable, from milky-white in specimens from deep levels to orange-brown in some specimens from moderate depths. The most coloured specimens present three faint brownish bands on the last whorl, the upper one being the thinner, but also the more accurately defined one (Figs 5, 7, 8, 10). The central and the basal bands are wider, but faintly marked or indiscernible in most cases. In some specimens, just the upper dark part of the central and anterior bands are visible, looking like one or two thin brown lines around the whorl. Numerous specimens have a light tan to yellowish semitransparent shell, without any decoration.
– As noted by Bavay, the size of the shell is very variable. We recorded lengths from 4.1 to 9.1 mm for shells belonging to the phena *V. serrei* (cf. below the

comparison with the phena *V. germaini*), that means a ratio from 1 to 2.25, a very large one within the genus *Volvarina*. For the closely related *V. exilis* Gmelin from Senegal, we note length ratios from 1 to 2.15.

Discussion.

V. serrei Bavay appears to be a valid species, widely distributed along the Brazilian coasts, and closely related to *V. mitrella* (Risso, 1826), which is the type species of the genus *Volvarina*. The Mediterranean *V. mitrella* has several close relatives along Northwestern Africa : *V. exilis* (Gmelin, 1791) from Senegal, *V. attenuata* (Reeve, 1865) from Mauritania and Senegal, and *V. roberti* Bavay, 1917 from Madeira and the Canary Islands. We note that *V. attenuata*, as *V. serrei*, currently presents a fifth columellar plait, an uncommon feature within the genus *Volvarina*. *V. eumorpha* (Melvill, 1906), from the Gulf of Oman, could belong to the same "complex *V. mitrella*". There is not any evident representative of this complex in the Caribbean Sea. As far as general shell morphology is concerned, *V. avena* could be a possible relative of *V. serrei*, but anatomical and biochemical data have to verify if the matter holds true. However, some Brazilian *Volvarina* seem more or less closely linked to *V. serrei*, and to be referable to the same complex of species, as examined in the course of this paper.

***Volvarina germaini* (Bavay, 1913)**
Figs 11-14

Marginella (Volvarina) germaini Bavay, 1913b, p. 483, pl. XX, figs 1, 2.

Type material.

Not found in MNHN (typothèque and general collection). However, a set of three shells is stored in the Dautzenberg collection (IRSNB) with the label : "*M. (Vol[n])germaini* Bavay. Bahia. Sables". Depending on the close relationship prevailing between Bavay and Dautzenberg, there is no doubt that this lot came from the sands sent by Mr Serre to Bavay, and has to be considered as belonging to the type material.
We do not know if Bavay described this species referring to a larger number of shells, and the status of types is not specified on Dautzenberg's label. We are no more able to distinguish if any one specimen from the Dautzenberg collection is represented by the type figures (Figs 13, 14), which seem to be a synthesis of several shells.
However, depending on the origin of Dautzenberg's lot, we consider these three shells as syntypes. Further investigations could reveal complementary type material in public or private collections.

Other material examined.

All in the collection of the author.
– Bahia State, Salvador. Eleven dead collected adult shells. Length : 3.1 to 3.7 mm.
– Pernambuco State. One dead collected adult shell. Length : 3.35 mm. Leg. J. Coltro, 02-98.

Original description.
(Translated from French).

"Small shell, subcylindrical, narrowed to the base; conical spire, slightly more obtuse to the top, with a noticeable height (it measures slightly less than a quarter of the total length of the shell), made of four whorls.
Slender triangular aperture, narrowed to the top and regularly widening to the base; left border with four columellar plaits, of which the three upper ones are equal, the last one, or lower, being slightly sharp, all oblique; labrum almost straight, thickened in his upper half-part.
Colour of the shell pale fawn; the last whorl is ornate with two lines : the upper one is linear, placed slightly above the middle of this whorl; the lower one, wider but less dark, is near to the base; the sutures are more or less tinged with fawn.
Length 3.5 mm; breadth : 1.8 mm; spire height : 0.8 mm".

Type locality.

Bahia, Brazil. In sands.

Distribution.

Known from Pernambuco State to Bahia State, Northeastern Brazil.

Habitat.

Unknown.

Remarks.

V. germaini is not separable from *V. serrei* on the strength of its shell characters. The phena *V. germaini* is just distinguished by its smaller size, a more transparent shell, a slightly more oval outline with tendency to a shorter blunt spire and a slightly more widened anterior part of the aperture, a more conspicuous spiral decoration, and a generally more apparent first columellar plait. The principal features characterizing the species *V. serrei* are however found in the phena *V. germaini* : similarity of the

structure of the spire, protoconch and teleoconch, of the general morphology and proportions of the body whorl, organisation of columellar plaits, outer lip and external varix. The absence of a fifth columellar plait is also dominant in small representatives of the phena *V. serrei*.

The main difference concerning the phena *V. germaini* is in the lightness of its shell, associated with its transparency, which gives more contrast to the spiral pattern of the decoration. These characters, as well as the tendency to a squatter outline, are commonly found in dwarf populations of testaceous marine gastropods, notwithstanding simple physical constraints of architecture and development. The same reasons could explain the tendency to an oval outline and the more protruding first columellar plait in *V. germaini*.

It is noted that the size-range of the phena *V. germaini* is perfectly complementary of the size-range of the phena *V. serrei*, and that their common size-range of variability is from 1 to 3.

Discussion.

The phena *V. germaini* could only represent the dwarf specimens within the populations belonging to the species *V. serrei*. Another possibility could be that these dwarf specimens have a population status as an ecological form expressing a local adaptation of the biologic species *V. serrei* to special environmental conditions.

However, this kind of situation is also favourable for speciation if reproductive isolation occurs. In the considered case, confirmation could come from field observations of live animals and populations. Such observations will allow to verify the suspected conspecificity of both phenae and the possible junior synonymy of *V. germaini* Bavay (1913b) with the former *V. serrei* Bavay (1913a).

Volvarina bahiensis (Tomlin, 1917)
Figs 15-17

Marginella joubini Bavay, 1913b, pp. 482-483, pl. XX, figs 3, 4 (not *M. joubini* Dautzenberg and Fisher, 1906).

Marginella bahiensis Tomlin, 1917, p. 252. Replacement name for *M. joubini* Bavay, 1913, not *M. joubini* Dautzenberg and Fisher, 1906.

Type material.

Holotype of *M. joubini* Bavay in MNHN. Length : 4.5 mm, breadth : 2.2 mm. However, the labrum is broken, and the initial breadth was probably 2.4 mm. Two original labels, from the hand of Bavay : "M. P. Serre, 1913. *Marginella joubini* Bavay. Bahia. Type." and "*Marginella joubini* Bavay. Type brisé. Bahia. Sables."

Other material examined.

All specimens in the collection of the author.
– Bahia State, Salvador. Two adult shells (Length/breadth : 4.2 x 1.5 mm, and 3.6 x 1.2 mm), and one juvenile (Length/breadth : 2.85 x 1.1 mm).

Original description.
(Translated from French).

"Fusiform slender shell, with an irregular conical-truncated spire, slightly narrowed at the level of the sutures, and rounded to the top; the last whorl of the shell is slightly narrowed to the base, its right border goes up rather suddenly and rather high along the aperture.

Narrow aperture in the upper part, then irregularly inflated to the base; labrum rather straight, thickened in its medium part which extends forwards, externally marginated; left border with four very subequal oblique plaits linked by a light deposit of enamel spread over all the left border.

Colour white. The remains of two or three fawn bands are indistinctly seen on the last whorl."

Type locality.

Bahia, Brazil, in sands.

Distribution.

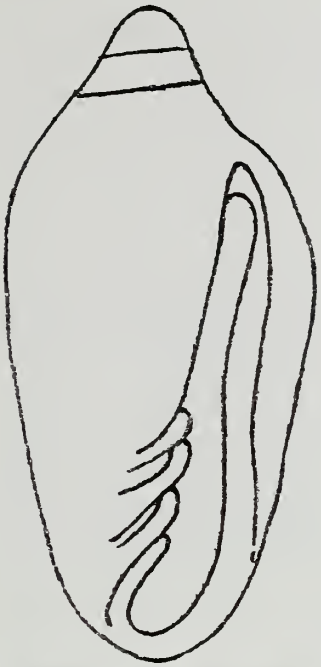
Known from Bahia State (Eastern Brazil).

Habitat.

Unknown.

Figures 2-10.

2. type figure of *Marginella (Volvarina) serrei* Bavay, 1913a, p. 360, fig. 3.
3. syntype of *Marginella (Volvarina)serrei* Bavay, 1913. MNHN (5 x 2.1 mm).
4. *Volvarina serrei* Bavay. Off Rio de Janeiro, 80-100 m. Coll. F.B. (7.9 x 4.1 mm).
5-7. *Volvarina serrei* Bavay. Ribeira, Salvador, Bahia, 1 m. Coll. F.B. (5.9 x 2.8 mm).
8-10. *Volvarina serrei* Bavay. Off Guarapari, Espirito Santo, 15-20 m. Coll. F.B.



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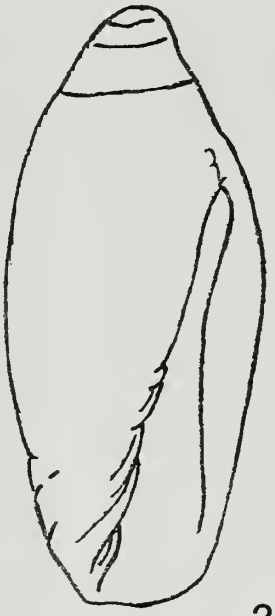

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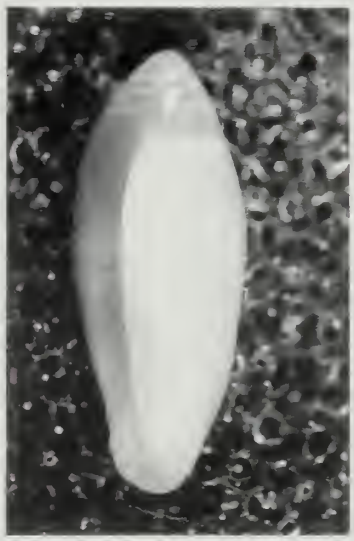

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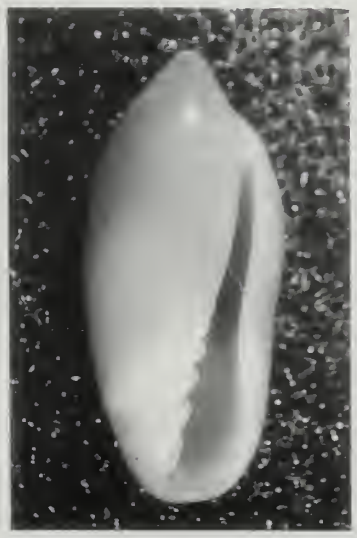

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9

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Remarks.

The type figure (Figs 16, 17) is slightly squatter than the holotype, which is slightly more slender. The accurate original description perfectly matches the fresh shells stored in the author's collection (Fig. 15).

Discussion.

The specific status of *V. bahiensis* is undoubted. The synonymy with *V. gracilis* (C.B. Adams, 1851) proposed by Rios (1985, p. 122) is incorrect. The shell of the North Caribbean *V. gracilis* is much larger (Fig. 18) and presents a deeply different shape of the anterior part, with a bulging left external anterior part and a less opened aperture. Columellar plaits of *V. gracilis* are more oblique and the third one is shorter than in *V. bahiensis*. The dimensions of the lectotype of *V. gracilis* (MCZ 186119, type locality : Jamaica) are : length = 6.35 mm, breadth = 2.25 mm. The dimensions of the two shells from Gran Cayman Island, in author's collection, are : length/breadth 7.35 x 2.7 and 7.25 x 2.6 mm.
Furthermore, the illustration of *V. gracilis* as presented in Rios (1985, pl. 42, fig. 547) seems to be a reproduction of the figure of the lectotype of *V. gracilis* as figured in Clench and Turner (1950, pl. 32, fig. 14), and not the representation of a shell collected in Brazil. No specimen of *V. gracilis* was observed in Brazilian samples and collections examined by the author. Therefore, the real occurrence of *V. gracilis* in Brazil is to be considered as doubtful.
The similar structure of their spires and labrums, and pattern of decoration could signify that *V. bahiensis* belongs to the same group than the North Caribbean *V. gracilis*.
Such a "group *V. gracilis*" could however be represented by more species in Brazilian waters. One fresh shell collected in Guarapari, Espirito Santo State, was examined from A. Wakefield collection (Great Britain), closely matching *V. bahiensis* in many aspects. Nevertheless, this shell was pure milky white, squatter and presented a wide subcylindrical spire with an important bulging and produced protoconch. This shell was unfortunately lost, and detailed investigations were stopped.
In fact, the range of variation of *V. bahiensis* is unknown, and it remains to verify with more extensive material if this specimen from Guarapari represented a geographic variant (or a subspecies) of a widespread species *V. bahiensis*, or a common individual variation within this species, or a separate and unnamed species with a more southern distribution.

***Volvarina perexilis* (Bavay, 1922)**
Figs 19, 20

Marginella perexilis Bavay, 1922, pp. 78-79, text-fig. 3.

Type material.

Six syntypes in MNHN : 1 destroyed juvenile shell, 4 adult shells very damaged, partially broken and corroded, 1 adult shell in a good state of conservation, here illustrated (Fig. 19) and designated as lectotype (length : 2.05 mm, breadth : 0.75 mm). The other shells were apparently smaller in their original condition. They have to be considered as paralectotypes. One label : "Dr Jousseaume 1921. *Marginella exilis* Jouss. Brésil."

Original description.
(Translated from French).

"Tiny shell, light and fragile, rather thick and with a rounded top; proportionally moderate last whorl, high and egg-shaped. The aperture is oblique, wide, with a slight sinus at its upper part. Length : 3.4 mm; breadth : 1.3 mm".

Type locality.

Soundings Bank, off Parahyba, northeastern coast of Brazil, in coral stone.

Distribution.

Only known from the type locality.

Habitat.

Possibly hard coral bottoms.

Remarks.

The selected lectotype perfectly matches the description. However, the type figure (Fig. 20) does not match so clearly, rather representing a biconical slender outline. The rounded top and egg-shaped last whorl displayed in the description are not apparent in the type figure, but they are perfectly apparent in the lectotype, as figured (Fig. 19). On the other hand, the type figure clearly shows the six distinct columellar plaits, which are present on the lectotype and not quoted in the description.
In his introduction, Bavay announced that shells collected off Parahyba were figured as a reconstruction from a synthesis between specimens and fragments. Yet, we note that all the paralectotypes suggest a very high spire, rather

bulging with a blunt top, as presented by the lectotype.
Therefore, the type figure could have been drawn with some "artistic licence", and partially inspired by the presence of another species in the original lots studied by Bavay from the Jousseaume collection. This late supposition is corroborated by the typical dimensions given by Bavay (length : 3.4 mm), when the six syntypes are not sized more than 2 mm.
However, there is no doubt about the identity of *V. perexilis*, since the description perfectly matches the deposited type material, confirmed to be specimens coming from the Jousseaume collection and provisionally stored by Jousseaume under the designation of "*Marginella exilis* Jouss."
We note that the lectotype does not present a developed callous varix at the level of the columellar plaits, when all the paralectotypes present a strong callus varix covering the columella and submerging the columellar plaits which are more or less indistinct. The same tendency seems to occur in the species *V. pupa* Bavay, as displayed below.

Discussion.

As there is also the case for the previous and the next species, *V. perexilis* is only known from very scarce material. However, these species are not necessarily rare in nature, but they probably remained elusive on account of their very small size and possibly of an habitat restricted to hard coral bottoms, in shallow to deep waters. Their gathering could only occur by diving and collecting with the help of special methods adapted to cryptic micromolluscs from hard bottoms : brushing the algal mat on stones, submarine sucking cleaner for coral holes, etc.
The systematic sampling of representative hard environments by teams of experienced divers requires some complex logistics and has rarely been performed in the past. In recent years, such expeditions in different parts of the world have yielded excellent results, so it is hoped that these activities could be organised in Brazil in the coming years.

***Volvarina pupa* (Bavay,1922)**
Figs 21, 22

Marginella pupa Bavay, 1922, pp. 79-80, text-fig. 4.

Type material.

Three syntypes in MNHN.
– One adult shell in good condition, with a deeply corroded spire, a slightly corroded siphonal canal and a chipped first columellar plait, here illustrated (Fig. 21), and designated as lectotype. Length : 2.8 mm; breadth : 1.1 mm.
– One adult shell badly damaged, partially broken and corroded, which had apparently the same size, proportions and outline than the lectotype in its original condition, and designated as paralectotype 1.
– One juvenile shell, shining and well-conserved, but unidentifiable, which has nevertheless to be considered as paralectotype 2, as being included in the same lot than the lectotype by Jousseaume and maintained by Bavay.
One label : "*Marginella exilis* sp. n. Côte du Brésil."

Original description.
(Translated from French).

"Small shell, light, fragile, egg-shaped, very slender, dirty white, obtuse conoidal spire, nearly cylindrical high last whorl. Rather wide aperture, vertical, inflated to the base, with four columellar plaits almost equal, occupying the lower third of the left border of the aperture; simple labrum slightly thickened in its medium part. Length : 3.6 mm; breadth : 1.4 mm".

Type locality.

Soundings Bank, off Parahyba, northeastern coast of Brazil, in coral stone.

Distribution.

Only known from the type locality.

Habitat.

Possibly hard coral bottoms.

Remarks.

The caricatural type figure (Fig. 22) gives a poor representation of the species. However, the type figure is not in real contradiction with the description by Bavay, which perfectly matches the lectotype (Fig. 21).
The lectotype bears a fifth columellar plait (note that the first one is broken), which is mostly submerged within an oblique varix of enamel developed along the columellar wall, and nearly obscured from the sight of the observer. It is suggested that a sixth plait is entirely submerged by enamel, and included in the columellar wall.
This feature, together with the general morphology of the shell, suggests a close relationship with *V. perexilis*. However, the distinction between both species seems to be clear on the ground of several morphologic characters, as the proportional size of the spire and protoconch, as well as the proportional length of the aperture.

As observed with *V. perexilis*, the typical size of *V. pupa* reported by Bavay (length, 3.6 mm) does not match the size of the type material (length of lectotype : 2.8 mm). This element confirms that Bavay studied more specimens from the Jousseaume collection than those now conserved in MNHN.
It seems that larger specimens pertaining to the original lot labelled as "*M. exilis*" by Jousseaume, and originally shared out between the phenae "*M. perexilis*" and "*M. pupa*" by Bavay, were later removed from both relevant lots and joined within a separate third lot made of large specimens which seems to be presently misplaced. Referring to their possible influence on the type figure of *V. perexilis*, we feel that specimens from this "third lot" could represent a different phena, apparently not so far from *V. amphorale* de Souza (cf. below).

Discussion.

These elements do not allow us to introduce any doubt about the identity of *V. pupa*, and about the status of the type material registered in Paris Museum, even if possibly incomplete. As far as shells are concerned, the discovery and the study of more specimens of both phenae *V. perexilis* and *V. pupa* could reveal their real range of variability and whether intergrades do exist.

***Volvarina amphorale* (de Souza, 1992)**
Fig. 23

Prunum amphorale de Souza, 1992, pp. 237-242, text-fig. 3.

Type material.

Holotype in MORG. Ten paratypes distributed between various institutions. Paratype 10 examined in MNHN, here figured (Fig. 23).
Dimensions of the holotype = length : 3.6 mm; breadth : 1.8 mm.
Dimensions of the paratype 10 = length : 4 mm; breadth : 1.8 mm.
Dimensions of the other paratypes = length : 3.3 to 4 mm; breadth : 1.6 to 2 mm.
The type specimens have been collected in several stations in Northern Brazil, off the mouths of the Amazon River, Belem and São Luis, in depths from 33 to 75 m.

Original description.

"Shell very small for the genus (length : 3.6 mm; width : 1.8 mm), consisting of 3.5 whorls, elongated with body whorl narrowing anteriorly. Spire conical, rather high (apical angle 54°). Protoconch indistinct from teleoconch, obliquely flattened apically. Surface smooth, unsculptured, entirely covered by a shiny enamel. Sutures hardly distinct, the inner ("false") suture more conspicuous.
Aperture narrow and elongate (aperture length : 2.3 mm), parallel sided. Outer lip thickened forming a faint varix inwards and slightly sinuous, smooth inside. Posterior end of the outer lip flaring, anterior end curved and gradually merging into the columella. Posterior part of the parietal wall slightly convex, covered by a transparent elongated callous. Columella straight with six folds, including the one at its base, the three most anterior oblique folds are subequal in size and much stronger than the posterior ones.
Colour pattern on the body whorl consisting of three indistinct orange brown spiral bands on a translucent creamy white background : one narrow band between suture and "false" suture, another broad band occupying almost 1/3 of the body whorl, the third band very faint, located just behind the anterior notch. Subsutural band also seen on the spire. Outer lip with three small blotches terminating the brown bands."

Type locality.

Off Pará State, Brazil, 01°52'27"N, 048°16'12"W, 47 m, on sandy bottom.

Distribution.

Only known from type material, off Pará State, in depths from 33 to 75 m.

Habitat.

Sandy bottoms, rather in upper circalittoral.

Remarks.

De Souza proposed the placement of the species into the genus *Prunum* Hermannsen, for the similarities of its outline (biconical shape with an angular shoulder) with that ones of some few Caribbean or Panamic species placed by authors in this genus.
In fact, the distinction between the genus *Volvarina* Hinds, 1844 and the genus *Prunum* Hermannsen, 1852 (type species *Voluta prunum* Gmelin, 1791) was never soundly established and it commonly relies on superficial features, such as the size of the shell and proportion of the spire, thickness of the shell, of the columellar plait and of the labrum, occurrence of labial teeth, pattern of decoration, etc.
Such criteria are flimsy, because each kind of combination between these features is known, without evident natural gap. On the contrary, a real continuity seems to be represented all along this morphologic complex *Volvarina-Prunum*.

It is noted that the different species classified within the genera *Volvarina* and *Prunum* seem to present more or less the same kind of external morphology for the soft parts, and a similar anatomy. The "comblike" radula is a constant and distinct feature in the complex *Volvarina-Prunum*. Further studies will however allow the distinction between several "tribes" within the group *Volvarina* (based on anatomic features and a reliable phyletic reconstruction) to be proposed.
Another current (even if artificial) means of taxonomic segregation within this complex is the presence of a thick outer margin bordered by a visible groove, as a characteristic feature for a "tribe" *Prunum*. This kind of segregation on a single secondary subtle feature is currently attempted by taxonomists in groups displaying a continuous variation of morphologies, as it is the case in the complex *Volvarina-Prunum*. However it should be pointed out that the thick outer margin with an associated groove is not correlated by other constant characters, and that intergrading species exist with this feature which is more or less frequently expressed in other related genera, principally within the complex *Marginella-Glabella-Dentimargo*, and in the genus *Granulina*.

Discussion.

We propose to place the species *"Prunum" amphorale* de Souza in the genus *Volvarina s.s.*, as the species presents some evident similarities (as far as the structure of the shell is concerned) with *V. mitrella* Risso, type species of the genus *Volvarina*. Furthermore, we note that the presence of a fifth columellar plait is not exceptional at all in the complex *V. mitrella*, as seen above, for instance in the species *V. attenuata* Reeve, or in *V. serrei* Bavay.
De Souza relates *V. amphorale* to *V. perexilis*, noting their common original feature of bearing six columellar plaits. Owing to this common feature, de Souza suggests that both species could be the representatives of a future new genus, if further anatomic studies of the soft parts confirm their autonomous status within the complex *Volvarina-Prunum*.
There is current scepticism on this point. Not only because the size of the shells and the number of columellar plaits are not decisive criteria of distinction in the complex *Volvarina-Prunum*, but also because the direct phyletic relationship between *V. amphorale* and *V. perexilis* is not evident at all. Except for the number of columellar plaits, both species present numerous and significant differences, such as the general shape of the shell, the structure of the spire and protoconch, but also in the pattern of insertion of columellar plaits. We note the long sigmoidal anterior plait in *V. amphorale*, a constant feature of the species, which is very different from the short straight anterior plait in *V. perexilis*.
It seems that de Souza only examined the type figure of *V. perexilis*, and did not study the type specimens. It has been noted that this type figure was incorrect and did not correctly match the original description and type material. On the other hand, it is strongly felt that this type figure was influenced by "larger specimens" possibly matching the shell morphology of *V. amphorale*. This fact could explain the close (but mistaken) similarity noted by de Souza.
De Souza compares *V. amphorale* to *V. pauli* de Jong and Coomans, 1988, and to *V. abbotti* de Jong and Coomans, 1988, both collected in Aruba and Curaçao, owing to the same tiny size of these species, and to the eight columellar folds numbered in *V. abbotti*. De Souza also notes that the generic position of *V. abbotti* is considered as provisional.
In fact, the eight columellar plaits of *V. abbotti* present a deeply different pattern with the plaits observed in *V. perexilis*, as the second to the seventh plaits are paired, when the first and the eighth ones are isolated. *V. pauli* bears only four very thin and oblique columellar plaits, but it is very similar to *V. abbotti* about the other features, its spire just being slightly more elevated than in *V. abbotti*, whose spire is just suggested.
The shells of both species *V. abbotti* and *V. pauli* present close affinities with those from the genus *Plesiocystiscus* Coovert and Coovert, 1995, principally about their bumped spire with submerged sutures and the white subtranslucent general colour, and the observation of the anatomy of their live animals will enable more precision to be made on their generic placement.
On the single ground of the shell features, we consider *V. amphorale* as related to the "tribe" *V. mitrella sensu lato*, and as having no close relatives known from the Caribbean Sea.

***Volvarina tunicata* n. sp.**
Figs 24-27

Type material.

Holotype : Adult specimen (Figs 24, 25). Length : 8.1 mm; breadth : 3.9 mm. Deposited in MNHN.
Paratype 1 : Adult specimen (Figs 26, 27). Length : 8 mm; breadth : 3.9 mm. Deposited in MNRJ.
Paratype 2 : Adult specimen. Length : 7.95 mm; breadth : 3.6 mm.
Paratype 3 : Adult specimen. Length : 7.1 mm; breadth : 3.4 mm.
Paratype 4 : Subadult specimen. Length : 8.1 mm; breadth : 3.35 mm.
Paratypes 2 to 4 in the collection of the author.

Holotype and paratypes were collected in Guarapari, Espirito Santo State, under rocks, 20-25 m, by diving. Rec. 01-92. Leg. J. Coltro.

Other material examined.

All specimens in the collection of the author :
– Bahia State, Salvador. One dead shell and two live adult specimens, collected under rocks, in 10-20 m, by diving. Length : 7.1 to 8 mm.
– Bahia State, off Abrolhos Islands. One live collected adult specimen, dredged in 40-50 m. Length : 7.65 mm; breadth : 3.3 mm. Leg. J. Coltro, 02-98.

Description.

Shell medium sized for its group (Length : 7.1 to 8.1 mm; breadth : 3.3 to 3.9 mm), consisting of 3.25 whorls, presenting a suboval outline with a produced spire. Medium sized protoconch, faintly budding and regularly outlined, creamy white to greyish transparent. External suture distinct, whitish underlined; inner suture more conspicuous, as a thin golden orange string. Aperture moderately widened to the base, sizing 3/4 of the total length of the shell. Labrum slightly flexuous in its medium part. Outer lip enveloping, its edge throwing towards the aperture, making a sharp external angle along the body whorl. Outer margin thin, narrow; bordering groove absent.
Columella bearing four plaits, rather strong, moderately oblique, regularly spaced out. The two anterior plaits are clearly produced towards the aperture, and the two posterior ones smaller and less produced.
Colour pattern of the body whorl consisting of a golden orange general covering cut off by two whitish spiral gaps : one of medium width at the first third of the body whorl, the other one, thinner sized, is situated slightly above the middle of the body whorl.
The spire is subtransparent creamy-white, except for the whitish bordered irregular external suture, and for the deep orange bordered inner suture.
Outer margin usually presents a whitish apertural edge, and a light orange border along the erased groove. The whitish spiral gaps cutting off the body whorl extend on the outer margin.

Type locality.

Guarapari, Espirito Santo State, in 20-25 m.

Distribution.

The species is recorded from Guarapari to Salvador, and from Abrolhos Islands, more or less all along the eastern coast of Brazil. If Cabo Frio seems to be the southern limit for this species, its northern distribution is to be verified, specially along the coasts of the Brazilian Northeast, from Recife to Fortaleza.

Habitat.

The species is recorded from 10 to 40-50 m, in sediment and under rocks, but further investigations are needed in shallow water.

Remarks.

The new species is very similar to *V. serrei* Bavay in many aspects and was probably confused with it by students for a long time. When comparing both species, the principal distinctive features for *V. tunicata* n. sp. are :
– The narrow outer margin restricted before the sharp external angle, mostly whitish, with a more or less orange zone towards the border and the medium part, and whitish along the apertural edge, instead of a wide outer margin covering the sharp external angle, decorated with a pattern of packed orange-brown horizontal stripes.
– The transparent whitish-cream to grey protoconch and teleoconch, instead of the opaque reddish-brown ones in large adult specimens.
– The strong and produced anterior columellar plait, well-spaced out with the second plait, instead of a weak and short anterior plait, more or less merging under the second plait. The four plaits seem to be a constant feature in the new species.
– The subtransparent body whorl with a general golden orange covering and two faint whitish gaps, instead of a general whitish cream to light-brown ground, without bands to three darker bands of an irregular width, the upper one, below the suture, being the most conspicuous.
These distinctive features are coherent together in each of both species, and any intergrading specimen or population is not known, although *V. tunicata* n. sp. lives sympatrically with *V. serrei* Bavay in several places of their distribution.
The species seems to be uncommon, clearly less abundant than *V. serrei*, and than another related species which is described below.

Etymology.

From Latin : weared with a tunic, draped in a film, covered by a skin. With reference to the general aspect suggested by the colour pattern of the shell.

***Volvarina brasiliana* n. sp.**
Figs 28-31

Type material.

Holotype : Adult specimen (Figs 28, 29). Length : 6.85 mm; breadth : 3.05 mm. Deposited in MNHN.
Paratype 1 : Adult specimen. Length : 6.9 mm; breadth : 3.1 mm. Deposited in MNRJ.
Paratype 2 : Adult specimen. Length : 7.05 mm; breadth : 3.25 mm.
Paratype 3 : Adult specimen. Length : 7 mm; breadth : 3.05 mm.
Paratypes 4 to 8 : Adults specimens. Length : 6.2 to 7 mm.
Paratypes 9 to 19 : Adults specimens. Length : 6.6 to 7.3 mm.
Paratypes 2 to 16 are in the collection of the author.
Paratype 17, in L. Bozzetti collection, Milano.
Paratype 18, in J. Coltro collection, São Paulo.
Paratype 19, in A. Wakefield collection, London.
All the type specimens were live collected in Barra, Salvador, Bahia State, in sand, under rocks, by diving, at different depths. Holotype and paratypes 1 to 3, 10-12 m, by B. Linhares, rec. 05/06-93. Paratypes 4 to 8, 4-6 m, rec. 10-91, leg. J. Coltro. Paratypes 9 to 19, 10-20 m.

Other material examined.

All specimens in the collection of the author.
– Rio Grande do Norte State, off Rio do Fogo. One adult live specimen and one adult dead shell, collected by diving in 20-30 m. Length : 6 to 6.35 mm. Rec. 11-97; leg. J. Coltro, 02-98.
– Pernambuco State. Three dead collected specimens. Length : 5.95 to 6.4 mm. Leg. J. Coltro, 02-98.
– Pernambuco State, Recife. Four live collected specimens. Length : 6.6 to 7 mm. Rec. 1990.
– Bahia State, Itaparica Island. Four adult live collected specimens, under rocks; in 1 m. Length : 6.9 to 7.8 mm. Rec. 05-90. Leg. J. Coltro.
– Bahia State, Itaparica Island. One adult dead shell (Figs 30, 31). Length : 6.8 mm. Rec. 13-03-91. Leg. P. de Souza Jr.
– Espirito Santo State, Guarapari. One adult live collected specimen, under rocks by diving, in 15-20 m. Length : 6.95 mm. Rec. A. Bodart, 10-92.
– Espirito Santo State, Meaipe. One adult dead collected specimen. Length : 6.5 mm. Rec. 01-84.

Description.

Shell small sized for its group (Length : 6 to 7.8 mm; breadth : 2.85 to 3.5 mm), consisting of 3.75 whorls, presenting a nearly oval outline, moderately spired. Small asymmetric protoconch, faintly budding, transparent whitish to creamy white. External suture faintly distinct, pale creamy white; inner suture more conspicuous, as a thin golden orange string.
Aperture moderately opening to the base, sizing 5/6 of the total length of the shell. Arched labrum, very faintly flexuous in its medium part.
Outer lip enveloping, its edge throwing towards the aperture, producing a sharp external angle along the body whorl. Outer margin thin, narrow; bordering groove clearly defined. Columella bearing four plaits, rather strong, moderately oblique, regularly spaced out. The two anterior ones being clearly produced towards the aperture, and the two posterior ones smaller and less produced.
Colour pattern consisting of four spiral orange bands, occasionally just expressed through deeper orange spiral lines corresponding to the borders of the banded pattern. The width of the bands decreases from the lower one, reaching the base of the shell, to the spire. The second band is situated on the middle of the last whorl; the third one is situated below the basal external suture, overlapping the basal inner suture line; the fourth one is situated in the same conditions below the next suture. Outer margin white, with three orange-brown horizontal marks, occasionally with a fourth well-coloured one on the anterior end of the last whorl, in a dorsal position above the siphonal canal.
The spire is subtransparent creamy white, except for the external decoration of orange bands.
In the northern part of the distribution, some specimens can bear a pink decoration instead of an orange one.

Type locality.

Barra, Salvador, Bahia State. In 4 to 20 m.

Distribution.

The species is recorded from Rio Grande do Norte State to Espirito Santo, all along the eastern coasts of Brazil.

Habitat.

The species is recorded from 1 to 20-30 m, under rocks.

Remarks.

The principal distinctive features of *V. brasiliana* n. sp., in comparison with *V. tunicata* n. sp., are :
– The groove bordering the outer margin is clearly defined instead of being erased, and the margin bears 3 or 4 well-defined orange-brown marks instead of being more or less orange towards the border and the medium part, and whitish along the apertural edge.

- The small slightly asymmetric protoconch, instead of a medium sized symmetrical outlined one.
- The less produced spire and the longer aperture, which sizes 5/6 of the total length of the shell in *V. brasiliana* n. sp., instead of 3/4 in *V. tunicata* n. sp. The general outline of the shell is nearly oval, instead of a suboval and more irregular outline.
- The subtransparent shell bearing a pattern of four orange bands (3 on the body whorl, and 1 more on the upper one), instead of a general golden orange ground cut off by two thin whitish gaps on the last whorl.

We note that the columellar plaits are identical in both species. However, this element is not sufficient to define *V. brasiliana* n. sp. as closely related to *V. tunicata* n. sp. In fact, their similar organisation and proportion of columellar plaits represent the most widespread pattern among the species of *Volvarina*.

BIOGEOGRAPHY

Even if the status of several taxa remains to be confirmed through further field observations, the proposed revision of the species of *Volvarina* described by Bavay and related species soundly demonstrates the important diversity occurring in this genus along the Brazilian coasts.

Except for *V. avena* Kiener, all the other revised species seem to be endemic from Brazil.

V. serrei Bavay and *V. tunicata* n. sp. show some close affinities with *V. mitrella* and several related species from Northwest Africa to the Gulf of Oman, as possible West Atlantic descendants of an old tethyan group of species. Even if possibly linked to the group *V. mitrella*, *V. brasiliana* n. sp. does not seem to be directly related to *V. serrei* Bavay, and could have closer affinities with populations represented in Southern Caribbean Sea (on study by the author).

ACKNOWLEDGEMENTS.

Thanks are due to Prof. Eliézer C. de Rios (Rio Grande), Jose Coltro (São Paulo) and Paulino J.S. de Souza Jr (Rio de Janeiro) for their kind cooperation; to Dr J. Van Goethem and Mr A. Lievrouw (IRSNB) for access to the Dautzenberg collection; to Prof. Philippe Bouchet, Philippe Maestrati and Virginie Héros (MNHN) for access to the type material and for their constant support; to Andrew Wakefield (Buckhurst Hill, Great Britain) for the correction of the english text; to Yves Finet (MHNG) for useful review of the article; to Robert Hasselot (Jouques, France) for typing up the manuscript.

This paper is dedicated to the missed Renato Moscatelli, kind correspondent and keen collector, who introduced the author to the Brazilian fauna.

REFERENCES.

Adams C.B. 1851 (March). Descriptions of new species and varieties of shells, which inhabit Jamaica. *Contributions to Conchology*, 8, pp. 129-140.

Bavay A. 1906 (23 Feb.) Sur quelques coquilles oubliées du Muséum de Paris. *Journal de Conchyliologie*, 53, pp. 248-249, pl. VII, figs 5, 6.

Bavay A. 1913a. Sables coquilliers recueillis par M. P. Serre à Bahia (Brésil). *Bulletin du MNHN*, Paris, 19 (6), pp. 358-360, text-figs 1-3.

Bavay A. 1913b. Sables de Bahia récoltés par M. Serre, Consul de France. *Bulletin du MNHN*, Paris, 19 (7), pp. 481-483, pl. 20, figs 1-4.

Bavay A. 1922. Marginelles nouvelles de la Collection Jousseaume. *Bulletin du MNHN*, Paris, 28 (1), pp. 76-81, text-figs 1-5.

Carcelles A.R. 1946. Notas sobre dos Especies Argentinas de Marginellidae. *Revista del Museo de la Plata*, 11 (92), pp. 51-57; 2 text-figs.

Carcelles A.R. 1953. Nuevas Especies de Gastropodos Marinos de las Republicas Oriental del Uruguay y Argentina. *Comunicaciones Zoologicas del Museo de Historia Natural de Montevideo*, 4 (70), pp. 1-16, pl. 1-5.

Clench W.J. & Turner R.D. 1950 (26 June). The Western Atlantic Marine Molluscs described by C.B. Adams. *Occasional Papers on Molluscs, Harvard University*, 1 (15), pp. 223-403, pl. 29-49.

Coovert G.A. & Coovert H.K. 1995. Revision of the Supraspecific Classification of Marginelliform Gastropods. *The Nautilus*, 2-3, pp. 43-110; 79 text-figs.

De Jong K.M. & Coomans H.E. 1988. *Marine Gastropods from Curaçao, Aruba and Bonaire*. E.T. Brill Ed., Leiden; 261 p., 47 pls.

Deshayes G.P. 1844 (Nov.) *Histoire naturelle des animaux sans vertèbres*. 10, Paris, 1835-1845.

De Souza P.J.S. Jr. A new species of Marginellid (Gastropoda : Prosobranchia) from the north coast of Brazil. *Journal of Conchology*, 34, pp. 237-242, text-figs 1-3.

Dupetit-Thouars A.A. 1840. *Voyage autour du monde sur la frégate "La Vénus" pendant les années 1836-1839*. 1, Paris, 1840-1864.

Gofas S. 1989 (31 Oct.) Le genre *Volvarina* (Marginellidae) dans la Méditerranée et l'Atlantique du Nord-est. *Bolletino Malacologico*, 25 (5-8), pp. 159-182, text-figs 1-25.

Kiener L.C. 1834-1841. *Genre Marginelle. Species Général et Iconographie des coquilles vivantes*; 44 p. 13 pls. J.B. Baillière et fils, Paris.

Mabille J. & De Rochebrune A.T. (in Rochebrune and Mabille, 1889). *Mission scientifique du cap*

Horn (1882-1883). 6 (2), pp. 51-52, pl. 3, figs 3a, b and 4a, b.

Marrat F.P. 1876. Description of five new Marginellidae. *The Quaterly Journal of Conchology*, 1, pp. 136-137.

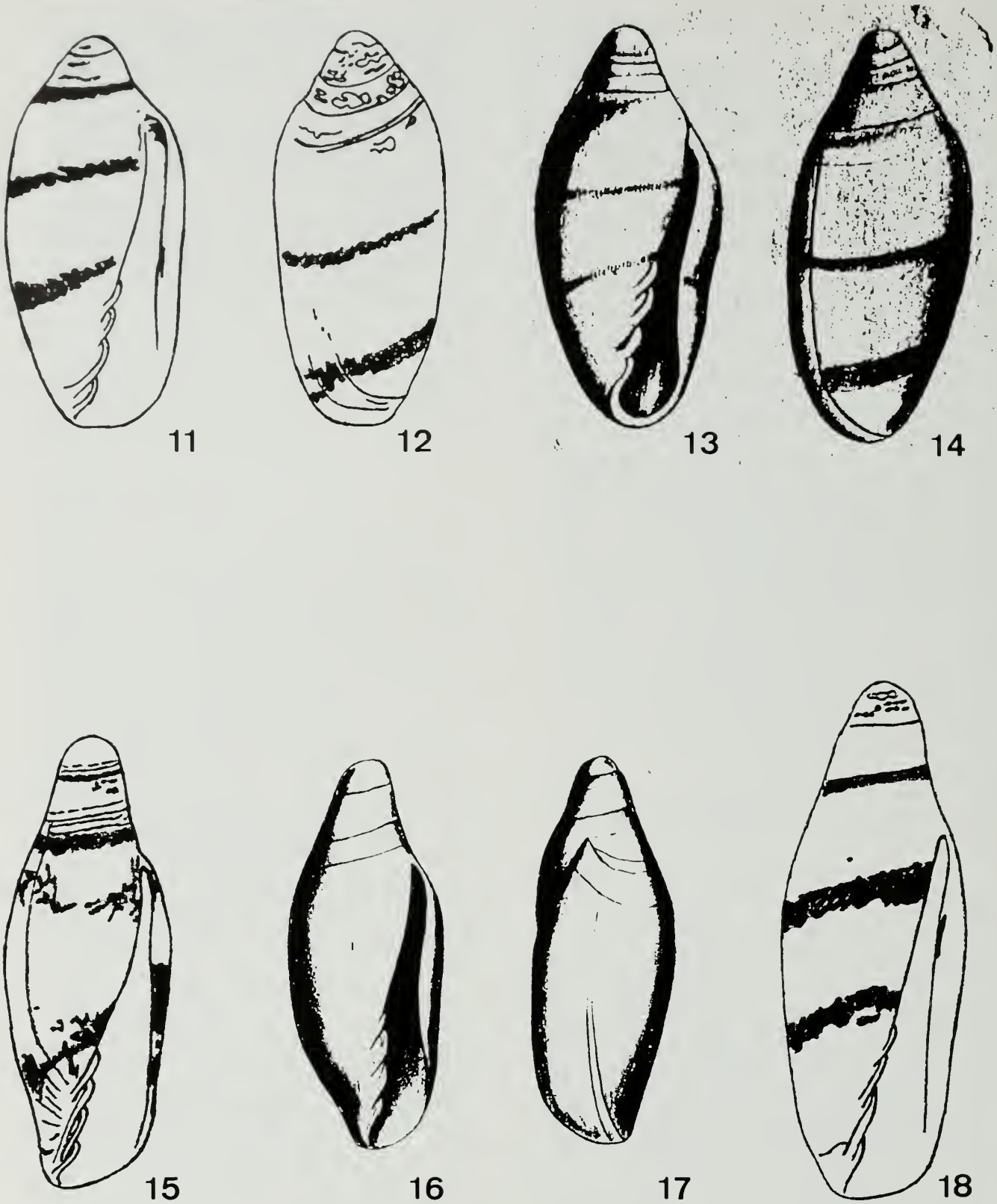
Powell A.W.B. 1951 (March). Antarctic and subantarctic Mollusca : Pelecipoda and Gastropoda, collected by the ships of the Discovery Committee during the years 1926-1937. *Discovery Reports*, 26, pp. 47-196, pls 5-10, text-figs A-N.

Rios E. de C. 1985 (Dec.) *Seashells of Brazil*. Museo Oceanográphico de Rio Grande do Sul; 329 p., 102 pls.

Rios E. de C. & Leal J.H. 1993 (March). *Volvarina pontesi*, a new bathyal marginellid (Mollusca : Gastropoda) from off Brazil. *Apex*, 8 (1-2), pp. 27-30, figs 1-8.

Tomlin J.R. le Brockton. 1917 (22 Aug.) A systematic list of the Marginellidae. *Proceedings of the Malacological Society of London*, 12 (5), pp. 242-306.

Ureta E.H. 1961 (Sept.) Nueva especie del Genero *Marginella* Lamarck para el Uruguay. *Communicaciones de la Sociedad Malacológica del Uruguay*, pp. 7-8; 1 text-fig.



11, 12. *Volvarina germaini* Bavay. Salvador, Bahia. Coll. F.B. (3.05 x 1.45 mm).
13, 14. Type figures of *Marginella (Volvarina) germaini* Bavay, 1913b, pl. XX, figs 1, 2.
15. *Volvarina bahiensis* Tomlin. Salvador, Bahia. Coll. F.B. (4.2 x 1.5 mm).
16, 17. Type figures of *Marginella joubini* Bavay, 1913b, pl. XX, figs 3, 4.
18. *Volvarina gracilis* C.B. Adams. Gran Cayman Island. Coll. F.B. (7.25 x 2.6 mm).

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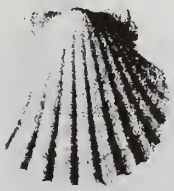

Des éponges qui creusent, qui creusent...

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ABSTRACT. A specimen of **Charonia lampas (Linnaeus, 1758)** totally pierced by a sponge (**Cliona**) has been collected alive in deep waters (100 m) of Finistère (France). The destroying actions of this Porifera on shell remains and limestone are taken into consideration.

INTRODUCTION

Nombre de mollusques marins vivent sous la protection de leur coquille calcaire, qu'ils soient bivalves ou gastéropodes prosobranches par exemple. Cependant, cette protection n'est pas absolue et il arrive que d'autres invertébrés viennent mettre à mal l'épaisseur de cette enveloppe protectrice en y creusant des galeries qui la fragilisent. C'est le cas des éponges perforantes du genre ***Cliona***.

RECOLTES PERSONNELLES

La figure 1 témoigne des ravages occasionnés par ce type d'éponge à un spécimen de ***Charonia lampas*** **(Linnaeus, 1758)** récolté vivant et operculé au large du Finistère (France) par une centaine de mètres de fond. La coquille est rongée sur toute sa hauteur ainsi que dans l'entièreté de son épaisseur. L'attaque est à ce point profonde qu'une fois vidée de son contenu, cette grosse coquille est quasi translucide. L'avant-dernier tour ainsi que l'antépénultième ont quasi totalement disparu. Les 4 à 5 premiers tours, perforés eux aussi, sont prêts à se désolidariser de l'ensemble. Pourtant, le mollusque était encore parfaitement vivant, isolé de son envahisseur par la fine couche calcaire nacrée recouvrant la partie interne de la coquille.

Comme nous avons pu le voir ci-dessus, l'éponge pénètre en profondeur dans l'épaisseur de la coquille de gros gastéropodes alors que ceux-ci sont encore en vie. De manière identique, l'éponge attaque aussi les grands spécimens de bivalves comme par exemple : ***Pecten maximus*** **(Linnaeus, 1758)** et ***Ostrea edulis*** **Linnaeus, 1758**. En baie de Saint-Brieuc (Côte d'Armor – France), il n'est pas un grand spécimen d'huître (pied de cheval) qui ne soit attaqué, en tout ou en partie, par ces éponges perforantes (figure 3). Cette peste redoutée dans le monde de l'ostréiculture est connue sous le nom de maladie du « pain d'épice » et est attribuée à l'action de ***Cliona celata*** **Grant, 1826**.

Cette éponge peut se présenter sous deux formes très différentes. La première est quasi invisible et vit, comme nous venons de l'évoquer, dans les galeries qu'elle creuse dans des substrats calcaires. Sa présence est révélée à la surface du substrat par les perforations hors desquelles s'épanouissent les papilles jaunes du porifère. Il existe aussi une seconde forme, plus massive et encroûtante, qui se répand en amas jaunes de très grandes dimensions à la surface des rochers (WEINBERG, 1998).

CONCLUSIONS

Outre les dégâts occasionnés à quelques gros mollusques vivants, les éponges perforantes, en s'attaquant encore aux coquilles mortes et vides (figure 2), contribuent à la disparition lente et progressive des débris coquilliers jonchant les fonds marins. L'action dévastatrice de ces éponges sur les roches sédimentaires calcaires est aussi un facteur important de l'érosion sous-marine.

REFERENCES

WEINBERG, S. 1998. *Découvrir l'Atlantique, la Manche et la mer du Nord.* Ed. Nathan (Paris, France).

LEGENDES

1 : *Charonia lampas* (Linnaeus, 1758) : 220 x 120 mm - Finistère - France (24/10/1999).

2 : *Ranella olearia* Linnaeus, 1771 : 165 x 95 mm - Fragment fossile (?) - Costa Brava - Espagne (21/09/1999).

3 : *Ostrea edulis* Linnaeus, 1758 : 135 x 130 mm - Baie de Saint-Brieuc - France (31/10/1983).

1

2

3

L'exposition An 2000 de la SBM

Claude VILVENS et tous les autres

Ainsi donc, ayant survécu au Bug de l'An 2000, tous les fidèles de la SBM avaient rassemblé leur énergie pour la première exposition portant un millésime débutant par "2" (ne dites pas que c'est la première du 3ème millénaire – on vous prendrait pour un aculturel du nombre ;-)). Les fidèles étaient donc là dans cette manifestation habituelle au mois de janvier, mais aussi de nouvelles têtes, ce qui est encourageant pour l'avenir de notre Société.

Comme d'habitude, je vous invite à suivre le guide parmi nos 12 exposants.

1. Jeanine et René MASSON

Promenade au pays des mitres